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NATIONAL CENTER FOR HEALTH SERVICES RESEARCH
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18-12 Parklawn Bldg. ■ Rockville, MD 20857 ■ 301/443-4100

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
National Center for Health Services Research
and Health Care Technology Assessment

HE 20.6512/6:

Suicide Mortality in the Maryland State Prison System, 1979 Through 1987

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Prisoners are reported to have a higher suicide rate than the community. We studied suicides in the Maryland prison system to determine the level of risk and risk factors for inmate suicide. There were 37 male inmate suicide deaths between 1979 and 1987 (39.6 suicides per 100 000 male inmates), which is significantly higher than the age- and race-adjusted male suicide rate in the general population of Maryland (22.0 per 100 000). Risk of male inmate suicide was increased for the following characteristics: white race (relative risk [RR], 2.0; 95% confidence interval [CI], 1.1 to 3.9), age 25 to 34 years (RR, 1.8; 95% CI, 1.0 to 3.4), major crime committed against person (RR, 3.4; 95% CI, 1.7 to 6.7), life sentence (RR, 4.7; 95% CI, 2.2 to 10.0), and classification to the major maximum security institution in the prison system (RR, 5.1; 95% CI, 2.7 to 9.8). The methods of suicide chosen by inmates were hanging (86%), cutting wound (5%), antidepressant overdose (5%), and fall from height (3%). We conclude that inmate suicide represents a significant correctional health and public health problem. Specific implications for prevention of inmate suicide are examined.

(*JAMA*. 1989;262:365-369)

THE HIGH rate of suicide in jails has been recognized for many years, with investigations into the problem going back more than 100 years.[1] National criminal justice statistics reported 399 suicides among jail inmates[2] and 85 among sentenced prisoners in state and federal prisons[3] in 1986. However, the quality of reporting is unknown, and some investigators suggest that the annual number of suicides among prisoners might be as high as 900 to 1000.[4]

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Although a number of studies have suggested that suicide is the leading cause of death among prisoners, the results often have been contradictory. Few studies have reported suicide rates or determined if the rates are in excess of those in outside communities.[5-7] Despite the recognition of the problem of inmate suicide by the American Medical Association's health care standards for corrections,[8] only limited work has been done by correctional systems in the intervening years.

One major problem in the studies to date is that they often fail to separate out the immediate period of incarceration, which takes place in local jails, from the long-term imprisonment of inmates following court sentencing. The early period of incarceration, particularly the first 24 hours after arrest, has been noted by a number of studies to have a high rate of suicide, which is said to be related to the short-term stresses of incarceration.[1,4,5,9,10] However, nearly all such studies have been performed in jails and ignore inmates in long-term prisons. In fact, little is known concerning the risk of suicide or other causes of death in prison populations. National criminal justice statistics provide little detail on deaths of prison inmates, grouping them only by type of death (natural, suicide, and homicide).[3,11]

This study was designed to investigate suicides among long-term (sentence >1 year) prisoners in the Maryland prison system between 1979 and 1987 to determine risk factors for inmate suicide and to compare these suicide rates with those that occur overall in the state of Maryland.

DESCRIPTION OF STUDY POPULATION

The Maryland state prison population consists of persons who have been convicted of a crime and sentenced to at least 1 year in prison. Most inmates were jailed before transfer to the state prison. From 1979 to 1987, the state prison population increased from 8102 to 12 767. In 1987, the inmates were 96% male and 73% black. Seventy-six percent were between ages 18 and 35 years. The current average sentence is 11.5 years, and inmates serve an average of 40 months, with a wide range for both of these characteristics. The state prison system, administered by the Maryland Division of Correction, Baltimore, has 20 institutions, which can be classified by security level: prerelease, minimum, medium, and maximum. Men and women have separate intake facilities, where all incoming inmates spend ap-

proximately 2 months; during this time they are evaluated by medical and correctional personnel.

METHODS

All inmate deaths in the Maryland state prison system between January 1, 1979, and December 31, 1987, were studied. Information on prisoner characteristics was obtained from the Maryland Division of Correction management information system, as were details of all deaths. In addition, more detailed information on cause of death was obtained from the death certificates at the Maryland Department of Health and Mental Hygiene, Division of Vital Statistics. All deaths classified as suicide on the death certificate were eligible for the study. All injury-related deaths, including suicides, were subject to examination by the Maryland medical examiner, who determined cause of death. For each subject, the following information was obtained: age, race, sex, date of death, institution, major offense category, length of sentence, date of incarceration, cause of death, and autopsy status. Length of incarceration at death was calculated from data from the Maryland Division of Correction.

Midyear prison census figures were supplied by the Office of Research and Statistics of the Maryland Department of Public Safety and Correctional Services, Baltimore. Beginning in 1981, an annual census of inmate characteristics was prepared using the prison management information system. The census reports prisoner characteristics by age, race, sex, institution, length of sentence, and type of major offense. The number of years at risk for inmates with these characteristics was determined for 1981 through 1987. The demographic variables were relatively stable over time, so average values were assumed to calculate prisoner-years for 1979 through 1980. Because the census uses nonstandard age groupings, the age distribution of August 1988 was applied to earlier years and used to calculate prisoner-years by age. The years at risk were tabulated individually, and prisoner-years at risk for suicide were compiled for the prisoner characteristics. The rate was defined as the number of suicides in the group of prisoners studied divided by the number of prisoner-years at risk for that group. The rates were expressed per 100 000 prisoner-years for comparative purposes. Suicides in the Maryland general population in 1983[12,13] were adjusted to the age and/or race distribution of the inmate population. The relative risk of suicide in a risk group was calculated as the ratio of the suicide rate of that group to that of the remaining groups. Standard deviation was calculated for mean rates, and 95% confidence intervals (CI) were used to determine statistical significance.[14]

Table 1.—Prisoner Population and Suicide Rate, Maryland Division of Correction, 1979 Through 1987

	No. of Suicides		Midyear Population		
Year	Male	Female	Male	Female	Male Suicide Rate*
1979	1	0	7818	284	12.8
1980	3	0	7507	272	40.0
1981	6	0	8076	301	74.3
1982	5	0	10007	370	50.0
1983	5	0	11325	377	44.2
1984	9	0	12056	417	74.7
1985	1	0	11971	445	8.4
1986	6	0	12373	419	48.5
1987	1	0	12312	455	8.1
Total	**37**	**0**	**93445**	**3340**	39.6

*Per 100 000 prisoner-years.

Table 2.—Male Inmate Suicide Rate by Age and Race, Maryland Division of Correction, 1979 Through 1987, Compared With Maryland General Population, 1983

Variable	No. of Suicides	No. of Prisoner-Years	Suicide Rate per 100 000	
			Inmates	General Population
Race				
B	21	67914	30.9	20.6*
W	16	25372	63.1	25.7*
Other†	0	159	0	N/A‡
Age, y				
15-24	9	23313	38.6	15.6§
25-34	23	43884	52.4	25.5§
35-44	4	19518	20.5	22.1§
45-54	1	4922	20.3	19.2§
55-64	0	1549	0	24.7§
≥65	0	259	0	23.6§
All	37	93445	39.6	22.0‖

*Age-adjusted to inmate population.
†Includes native Americans and Asians.
‡N/A indicates not available.
§Race-adjusted to inmate population.
‖Age- and race-adjusted to inmate population.

RESULTS

Suicide Rates Among Inmates

A total of 206 inmate deaths occurred in the Maryland prison system between January 1, 1979, and December 31, 1987. Thirty-seven (17.7%) were classified as suicide on the death certificate by the medical examiner. Thirty-five suicide victims (95%) underwent complete autopsy examination. During the study period, 2 deaths were classified as undetermined, 17 as drug related (short- or long-term intravenous narcotism), 9 as accidents, and 141 as natural deaths. No female inmates committed suicide during the study period. The number of male suicides and the sex-specific crude annual suicide rate varied by year (Table 1). The crude suicide rate among men was 39.6 per 100 000 prisoners per year. Suicide ranked second to heart disease (48 per 100 000) in terms of crude death rate but first in terms of years of potential life lost before age 65 years,[15] reflecting the fact that suicide rates were higher in younger male inmates (Table 2).

Demographics of Inmates Who Committed Suicide

Of the 37 inmates who committed suicide, 21 were black and 16 were white (Table 2). White male prisoners had a significantly higher risk of suicide compared with black male prisoners (relative risk, 2.0; 95% CI, 1.1 to 3.9). One black inmate with a Hispanic surname committed suicide, but because the management information system does not track Hispanic inmates, a comparable rate could not be computed. However, Hispanics make up only 1.5% of the Maryland general population[13] and probably do not make up a substantial proportion of the inmate population.

Table 3.—Male Inmate Suicide Rate by Major Offense, Length of Sentence, and Institution, Maryland Division of Correction, 1979 Through 1987

Variable	No. of Suicides	Prisoner-Years	Suicide Rate*
Major offense†			
Murder or manslaughter	11	12058	91.2
Rape or sex offense	6	8027	74.8
Assault or kidnapping	6	11911	50.4
Robbery, burglary, or arson	9	39499	22.8
All other	4	21300	18.8
Length of sentence, mo†			
0-18	4	8073	49.6
19-96	4	37588	10.6
97-180	9	21959	41.0
>180	10	19661	50.9
Life sentence	9	6164	146.0
Institution (security level)			
A (maximum)	16	12170	131.5
B (medium)	8	14234	56.2
C (maximum—intake)	3	6656	45.1
D (medium)	5	16094	31.1
E (medium)	1	3632	27.5
F (medium)	3	22250	13.5
All other (minimum and prerelease)	1	18409	5.4

*Per 100 000 prisoner-years.
†Excludes one suicide, information unavailable.

Table 4.—Length of Time Served at Suicide vs Length of Sentence for Male Inmates Who Committed Suicide, Maryland Division of Correction, 1979 Through 1987*

	Sentence, mo					
Time Served, mo	0-18	19-96	97-180	>180	Life	Total (%†)
0-1	2	0	0	2	0	4 (11)
2-18	2	3	3	0	2	10 (28)
19-36	...	0	2	4	3	9 (26)
37-96	...	1	4	1	2	8 (22)
97-180	...	...	0	2	2	4 (11)
>180	...	...	...	1	0	1 (3)

*Excludes one suicide, information unavailable.
†Does not add to 100% because of rounding.

The mean ± SD age at suicide was 29.3 ± 6.0 years (median, 29 years). The suicide rate was highest for those aged 25 to 34 years (52.4 per 100 000), and the relative risk of suicide among this group was 1.8 (95% CI, 1.0 to 3.6) compared with male inmates of all other ages.

Characteristics of Inmates Who Committed Suicide

Twenty-three inmate suicides (62%) occurred among those whose major crime had been committed against person (eg, murder, manslaughter, rape, sex offense, assault, or kidnapping), whereas 13 (35%) had committed their major crime against property (robbery, burglary, arson, and all others) (Table 3). Information was unavailable for one inmate who committed suicide. The suicide rate of men who committed crimes against person was 71.9 per 100 000 prisoner-years, which represents a relative risk 3.4 times (95% CI, 1.7 to 6.7) that of men who committed crimes against property. Nine suicides occurred among those serving a life sentence (including one inmate under sentence of death), and this group had a much higher suicide rate (146.0 per 100 000 prisoner-years) compared with all others (30.9 per 100 000), for a relative risk of 4.7 (95% CI, 2.2 to 10.0).

The mean ± SD duration of incarceration at time of suicide was 43.1 ± 46.8 months (median, 24 months). Timing of suicide relative to parole hearings was not available. The length of time served by inmates who committed suicide varied widely, with only 3% of suicides occurring in those who had served more than 180 months (Table 4). However, comparison data on length of time served were not available from prison authorities for the general inmate population.

The highest rate of suicide occurred at institution A, a maximum security facility (131.5 suicides per 100 000 prisoner-years), which represents a relative risk 5.1 times (95% CI, 2.7 to 9.8) that of inmates in other institutions (Table 3). Only one suicide occurred in minimum security and prerelease facilities: a detainee who jumped from a height while on home leave from a prerelease facility.

Hanging was the method of suicide in 32 inmates (86%), cutting wound in 2 (5%), antidepressant overdose in 2 (5%), and fall from height in 1 (3%). There was no significant variation in suicide rate by month or day of the week.

COMMENT

Comparison With State and National Suicide Rates

The crude male inmate suicide rate is twice the general Maryland population crude male suicide rate of 18.4 per 100 000 population in 1983.[16] Age and race adjustment of the 1983 Maryland suicide rate to the inmate population (22.0 per 100 000) continues to confirm the excess risk of suicide to prison inmates (39.6 per 100 000). Suicide ranks second as a cause of inmate death, compared with eighth in cause of death overall in Maryland[16] and the United States.[17] Suicide ranks first among inmates as a cause of years of potential life lost before age 65 years, compared with fifth in the general US population.[18]

Two prior studies, one from a city jail[5] and one from a state prison,[7] found that inmates have a higher suicide rate than the general population. The present study found a male inmate suicide rate intermediate between those studies and higher than that of a federal penitentiary,[6] where the suicide rate was lower than that in the general population (Table 5). This study found an inmate suicide rate higher than the national rate (24.8 per 100 000 prisoners), calculated from 1980 state prison data.[11] However, differences in age composition and completeness of suicide reporting make such a comparison difficult.

A major explanation for the differences seen in the studies in Table 5 is the type of inmates in federal and state prisons and jails. Jails contain arrested persons awaiting trial and convicted persons with short sentences. While it has been recognized that an excess of suicides occur in jails, the rapid turnover of prisoners leads to difficulties with calculation of rates.[5] State prisons generally contain only convicts with a sentence of 1 year or more. Federal prisons contain persons convicted of federal offenses. Each population differs from the others and might have a separate set of risks

Table 5.—Comparison of Prior Studies of Male Inmate Suicide

Study	Location	Type of Facility	Time Period	No. of Suicides	Crude Suicide Rate*	Proportionate Mortality Ratio, %
			US Studies			
Present study	Maryland	State prison	1979-1987	37	39.6	17.7
Rieger[4]	Pennsylvania	Federal prison	1950-1969	41	10.5	N/A†
Anno[7]	Texas	State prison	1980-1985	38	18.6	N/A
Flanagan and McLeod[11]	50 states	State prison	1980	74	24.3	10.8
Smialek and Spitz[4]	Michigan	Local jail	1976-1977	20	N/A	80
Novick and Remmlinger[6]	New York, NY	Local jail	1971-1976	52	96.0	40.6
Copeland[19]	Florida	Local jail	1956-1982	48	N/A	20.9
Lanphear[20]	Tennessee	Local jail	1970-1985	8	N/A	22.8
			International Studies			
Topp[1]	Britain	Prison	1958-1971	186	42	N/A
Backett[9]	Scotland	Prison	1970-1982	33	51.8	37
Clavel et al[21]	France	Prison	1977-1983	104	80.9	36.4
Pounder[22]	Australia	Prison	1973-1983	10	N/A	32.2

*Per 100 000 prisoner-years.
†N/A indicates not available.

for suicide, as well as different suicide rates.

Risk Factors for Inmate Suicide

Prisoners between ages 15 and 34 years are at twice the risk for suicide as the Maryland general population of the same age. Older inmates have a lower suicide rate relative to younger inmates and the general population. The absence of suicides among female inmates might be explained by the fact that they represent only 3.5% of the inmate population. Given that female inmates accounted for 3340 prisoner-years at risk of suicide, a female rate of 30 per 100 000 would be required to yield a single suicide, which is much higher than the Maryland 1983 female suicide rate of 5.5 per 100 000 population.[16]

To our knowledge, this is the first study that demonstrates significant racial differences in inmate suicide rates. These differences are similar to those seen in the general population.[17,23] White inmates were twice as likely as black inmates to commit suicide. This study is also the first demonstration that prisoner suicides occur disproportionately among those convicted of crimes against person. Two prior studies found negative results[6,24] and another found conflicting results.[5] The present study also confirms the previous finding[24] that inmates who serve a life sentence are more likely to commit suicide than other inmates. Because murderers frequently are sentenced to life imprisonment and commonly serve in institution A, confounding is present, which could not be adjusted for in the present study.

The high suicide rate in institution A is of concern but must be interpreted with caution. This rate could be explained by its maximum security level or the types of crimes and lengths of sentences among its inmates. To determine if these factors were independent, stratified analysis was tried without success. The three variables are so closely associated that it was impossible to separate them out in the analysis. In addition, all suicides in maximum security prisons were among inmates convicted of crimes against person, and, thus, it is impossible to analyze each characteristic independently. The limited census data available from the prison information system precluded performance of multiple logistic regression. Nevertheless, the fact that nearly half of the inmate suicides took place in this institution (Table 3) suggests that priority should be given to a more in-depth study in this institution to determine more specific predictors of risk and that highly targeted training of this prison's correctional and medical staff could have a major impact on suicide rates.

The finding that prison inmates commit suicide throughout the period of their sentence (Table 4) confirms a prior study from the Texas prison system.[7] Although the present study does not allow determination of rates, the wide range of length of incarceration is striking. This illustrates an important difference between prison and jail suicides, which most commonly occur within 24 hours of confinement.[1,4,5,9,10] The intake facility was found to have a slightly higher rate than the average for all prisoners, which might be expected given this pattern.

Hanging is the most common method of inmate suicide, accounting for 86% of suicides in the present study. This has been seen in numerous prior studies.[1,4-7,9,19-22,24,25] Inmates use different methods of suicide from the general population, in which more than 50% of suicides are committed with firearms.[18,25] Antidepressant medications were used by two inmates; despite their low frequency, these could be prevented easily by dispensing single liquid doses of medication and observing their ingestion.

It is possible that the present study underestimates the rate of inmate suicide. Suicides might suffer from poor or inconsistent ascertainment. They can be misclassified as "accident" or "death due to undetermined cause." While all violent deaths are investigated by the state medical examiner, there has been considerable variation between medical examiners in the classification of deaths as suicide or other, particularly when psychological information might or might not be available.[26]

CONCLUSIONS

Suicide represents a significant public health problem not only in jails but also in long-term prisons. That suicide is the leading cause of lost years of potential life in this prison system suggests that correctional health care personnel must maintain a high index of suspicion for suicide risk among inmates, since it represents potentially the most preventable cause of death in prisons. All incoming inmates should be assessed for suicidal risk. The psychotic or psychiatrically disturbed inmate is probably at highest risk, based on prior studies,[27,28] and should have early psychiatric intervention. The use of mental health professionals in the intake process should be emphasized. The risk factors identified in this study can be used to suggest a profile of the inmate at high risk of suicide. However, more work is needed to identify individual inmates who might merit special suicide prevention programs, especially since such

acts are impulsive and occur at a low frequency.[29]

Correctional health personnel must maintain a high index of suspicion for suicidal inmates during all health care encounters. Preventive interventions should be considered for long-term inmates, particularly those with life sentences. A number of authors[4,8,20,22,25] have suggested methods to prevent jail suicide, although few have been evaluated rigorously and their appropriateness in long-term prison populations has not been determined.

The increasing suicide rate among white males in the community[30] and the increasing inmate population suggest that suicide might become even more important as a prison health problem. The increased risk of suicide among patients with acquired immunodeficiency syndrome[31] suggests another potentially significant factor in future inmate suicides. Fewer than 20 inmates in Maryland were diagnosed with acquired immunodeficiency syndrome, and none of them committed suicide during the study period.

Since development of the American Medical Association's correctional health standards, correctional administrators have made suicide prevention a major initiative[32]; however, improved efforts are needed. This will require a concerted effort of medical and correctional personnel. Class action suits against prisons for suicides emphasize the legal liability and responsibility of prisons to take action to prevent suicides.[6] Security staff should be aware of the importance of inmate suicide as a preventable problem so that they can be involved in prevention programs.

Future research should focus on studies that compare suicide risk across different systems: federal, state, and local. Larger studies to analyze the separate effects of correctional characteristics (facility, sentence, and crime) are needed, including the use of multivariate analysis. Effectiveness of prison suicide prevention programs on the long-term prisoner should be examined. Detailed investigations including psychological studies of each inmate suicide (psychological autopsies[26,33]) might identify more specific factors important in preventing inmate suicide.

We are indebted to Tom Stough and Roy Tansill for help in collecting data and to John Rakis, Katy Benjamin, and the anonymous reviewers for helpful comments.

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